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ABSTRACT

This issue brief presents data illustrating the diversity across federal agency support in the science and engineering fields as emphasized in their funding of both academic research and science and engineering graduate students. Funding data show that changes in the balance of academic research funding across agencies are likely to affect both the distribution of research funding among science and engineering fields and the availability of federal research assistantships and other types of support to graduate students. (WRM)

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What is the Federal Role in Supporting Academic Research and Graduate Research Assistants?

by
Alan I. Rapoport

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NATIONAL SCIENCE FOUNDATION
Directorate for Social, Behavioral, and Economic Sciences

WHAT IS THE FEDERAL ROLE IN SUPPORTING ACADEMIC RESEARCH AND GRADUATE RESEARCH ASSISTANTS?

by Alan I. Rapoport

Division of Science Resources Studies

ISSUE BRIEF

April 16, 1999

The level and distribution of Federal academic R&D funds and graduate student support result from the funding decisions of individual agencies.

Electronic Dissemination

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NSF 99-342

The Federal Government is a major financial supporter of both academic research and development (R&D) and science and engineering (S&E) graduate students. The overall level and the distribution of both its academic R&D and graduate student support result from the funding decisions of individual agencies. The agencies' different missions lead them to adopt different emphases in the fields they support and in their R&D and graduate assistance programs. For many of these agencies, the major form of graduate student support is indirect, through research assistantships, rather than through direct fellowships or traineeships.

The balance of academic R&D funding across agencies is therefore likely to affect the distribution of support among both S&E fields and graduate students. This Issue Brief examines the current (1997) distribution of Federal agencies' academic R&D support across S&E fields, the nature and distribution of their graduate student support, and their relative importance in the Federal support received by specific S&E fields.[1]

In 1997, the Federal Government provided an estimated 60 percent of academic R&D funds. It also was the primary source of financial support for 20 percent of all full-time S&E graduate students (30 percent if those whose primary support is from own, spouse, or family resources are excluded). However, for half of those students whose primary support mechanism was a research assistantship (RA), the Federal Government was the primary source of financial support.

Federal obligations for academic R&D are concentrated in a small number of agencies. The National Institutes of Health (NIH), the National Science Foundation (NSF), the Department of Defense (DoD), the National Aeronautics and Space Administration (NASA), and the Department of Agriculture (USDA) combined provided an estimated 91 percent of total Federal financing in 1997.[2] Federal support for S&E graduate students is also relatively concentrated in the same five agencies: 75 percent of all students with primary support from the Federal Government and also 75 percent of students whose primary mechanism is a federally funded RA.[3]

	Percent of academic R&D support	Percent of federally funded RAs
• NIH	56	24[4]
• NSF	14	25
• DoD	11	15
• NASA	6	5
• USDA	4	6

Federal Academic Research Support by Field[5]

Federal agencies emphasize different S&E fields in their funding of academic research. Several agencies concentrate much of their funding in one field. NIH spends 89 percent of its funds on the life sciences.[6] USDA also spends three-quarters of its academic research funds in the same field.[7] Other agencies—

[1] The discussion focuses on five selected agencies, which together accounted for 91 percent of Federal academic R&D support in 1997. It focuses on these agencies because they are the only ones identified individually in the 1997 Survey of Graduate Students and Postdoctorates in Science and Engineering, which is the source of the graduate student support data cited here.

[2] The Department of Energy (DOE) provided an additional 5 percent of the 1997 obligations for academic R&D.

[3] See National Science Board, *Science & Engineering Indicators—1998*, NSB 98-1 (Washington, DC: U.S. Government Printing Office, 1998), chapter 5, "Federal Support of Academic R&D" for trend data.

[4] NIH provides a larger-than-average share of its graduate support—25 percent—through traineeships.

[5] Only Federal funds in support of basic and applied research, but not development, are categorized by field of science and engineering.

[6] NIH is part of the Department of Health and Human Services (HHS). It provides 98 percent of HHS's total academic research funding and its life sciences academic research funding.

[7] Another agency, not included in this analysis, that concentrates its academic research funding is DOE, which allocates 60 percent of it to the physical sciences.

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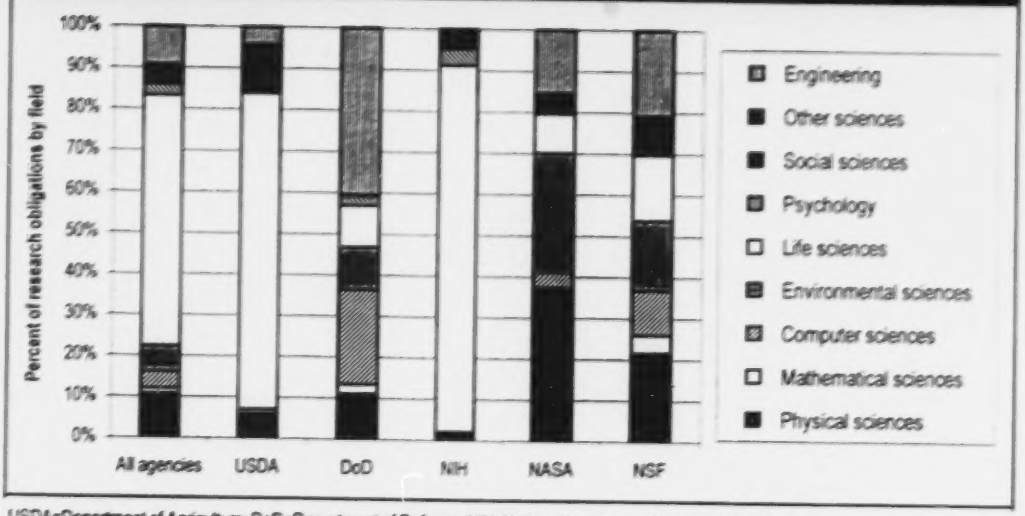
NSF, NASA, and DoD—have more diversified funding patterns. About 20 percent of NSF funds each go to the physical sciences and engineering, with another 16-17 percent to both the life sciences and the environmental (earth, atmospheric, and oceanographic) sciences. NASA's distribution is 37 percent to the physical sciences, 29 percent to the environmental sciences, and 15 percent to engineering. DoD provides 40 percent of its academic research support to engineering, 23 percent to the computer sciences, about 11 percent to the physical sciences, and 10 percent to both the life and environmental sciences (figure 1).

Federal agencies emphasize different S&E fields in their funding of academic research and in their support of graduate students.

Figure 1. Distribution of selected Federal agency academic research obligations by field: FY 1997



USDA=Department of Agriculture; DoD=Department of Defense; NIH=National Institutes of Health; NASA=National Aeronautics and Space Administration; NSF=National Science Foundation

NOTE: All agencies include the Department of Energy and other parts of the Department of Health and Human Services (in addition to NIH), plus the five agencies indicated above. Life sciences include the health fields.

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Federal Funds for Research and Development.

Even though an agency may place a large share of its academic research funds in one field, it may not be a leading contributor to that field (figure 2). NSF is the lead funding agency in the physical sciences (34 percent of total funding), the mathematical sciences (65 percent), the social sciences (38 percent), and the environmental sciences (46 percent). DoD is the lead funding agency in computer science (49 percent) and engineering (38 percent). NIH is the lead funding agency in the life sciences (86 percent) and psychology (89 percent). Within finer S&E field classifications, other agencies take the leading role.[1]

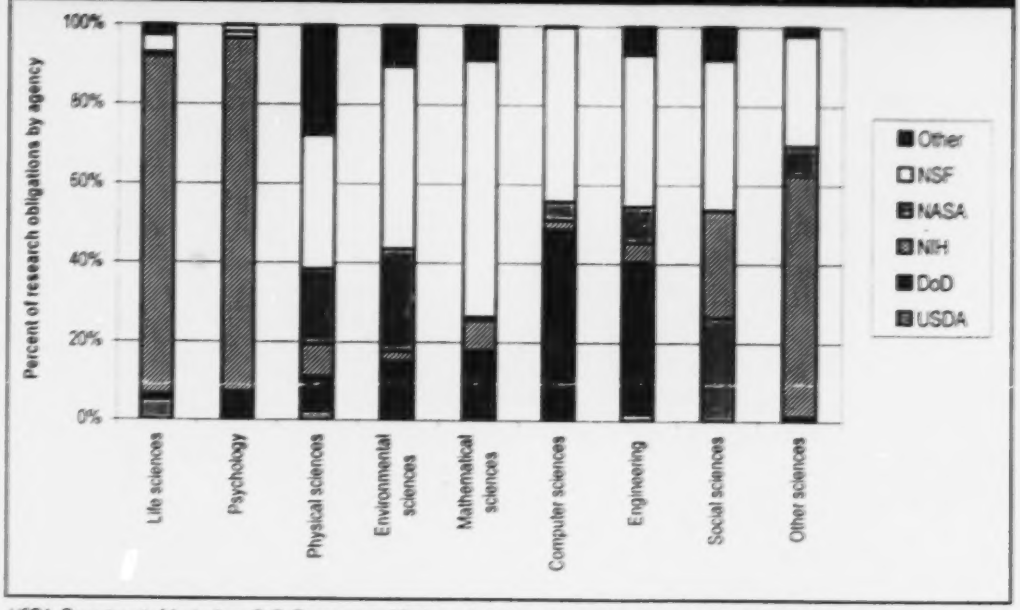
Agency Support of S&E Graduate Research Assistantships by Field

Just as Federal agencies emphasize different S&E fields in their funding of academic research, they also emphasize different fields in their support of graduate research assistants. NIH concentrates its RA support in the life sciences (73 percent), as does USDA (74 percent). DoD and NASA concentrate their RA support in engineering (58 and 51 percent, respectively). NSF, on the other hand, has a more diversified RA support pattern, with 36 percent in engineering, 29 percent in the physical sciences, and 10 percent in both the environmental and computer sciences (figure 3).

In terms of agencies' importance to Federal graduate RAs in particular fields (figure 4):

[1] See National Science Board, *Science & Engineering Indicators—1998*, NSB 98-1 (Washington, DC: U.S. Government Printing Office, 1998), chapter 5, appendix tables 5-10 and 5-11 for more detailed information.

Figure 2. Selected Federal agency field shares of academic research obligations: FY 1997

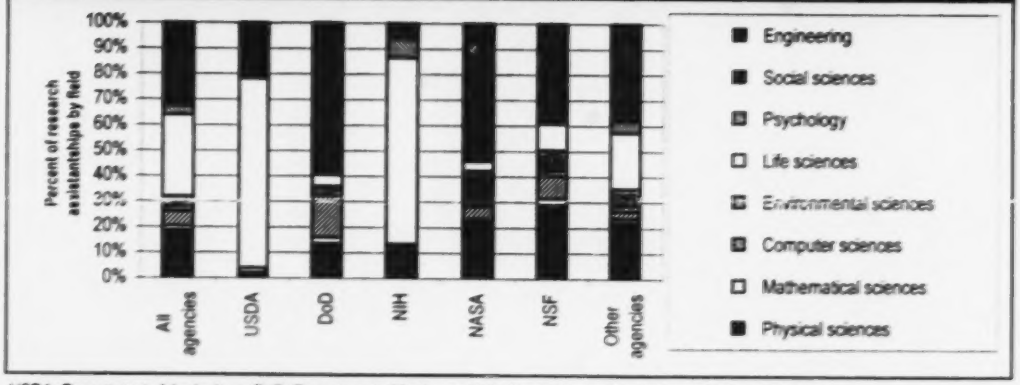


USDA=Department of Agriculture; DoD=Department of Defense; NIH=National Institutes of Health; NASA=National Aeronautics and Space Administration; NSF=National Science Foundation

NOTE: Other agencies include the Department of Energy and other parts of the Department of Health and Human Services in addition to NIH. Life sciences include the health fields.

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Federal Funds for Research and Development.

Figure 3. Distribution of selected Federal agency research assistantships by field: FY 1997



USDA=Department of Agriculture; DoD=Department of Defense; NIH=National Institutes of Health; NASA=National Aeronautics and Space Administration NSF=National Science Foundation

NOTE: Life sciences include the health fields.

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Graduate Students and Postdoctorates in Science and Engineering.

- NSF is the lead supporting agency in the mathematical sciences (41 percent of federally supported RAs), the environmental sciences (41 percent), the physical sciences (37 percent), and in engineering (29 percent).
- NIH is the lead support agency in the life sciences (60 percent) and psychology (56 percent).
- DoD is the lead support agency in the computer sciences (43 percent).[9]

[9] To see which agencies take the leading role within finer S&E field classifications, see National Science Board, *Science & Engineering Indicators—1998*, NSB 98-1 (Washington, DC: U.S. Government Printing Office, 1998), chapter 5, appendix tables 5-42 and 5-43.

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Conclusion

These data illustrate the diversity across Federal agencies' support in the S&E fields emphasized in their funding of both academic research and S&E graduate students. They show that changes in the balance of academic research funding across agencies are likely to affect both the distribution of research funding among S&E fields and the availability of Federal RAs and other types of support to graduate students.

Sources

The sources of data for this issue brief are: 1) the Survey of Federal Funds for Research and Development, which is an annual survey designed to obtain data about Federal funding for R&D in the United States; and 2) the Survey of Graduate Students and Postdoctorates in Science and Engineering, which is an annual survey designed to obtain data on the number and characteristics of graduate science and engineering students enrolled in U.S. institutions, including information on primary sources and mechanisms of financial support.

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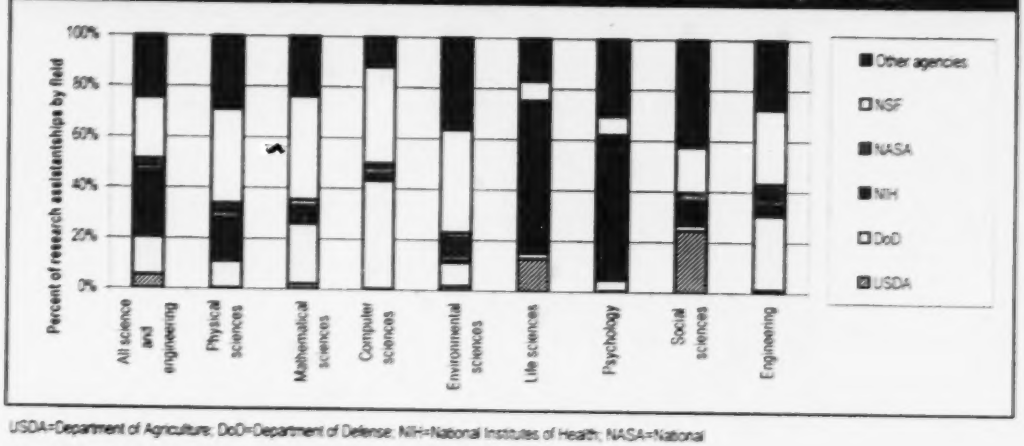
Figure 4 Selected Federal agency field shares of research assistantships: FY 1997



USDA=Department of Agriculture; DoD=Department of Defense; NIH=National Institutes of Health; NASA=National Aeronautics and Space Administration; NSF=National Science Foundation

NOTE: Life sciences include the health fields.

SOURCE: National Science Foundation, Division of Science Resources Studies, Survey of Graduate Students and Postdoctorates in Science and Engineering.

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